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PERNICIOUS ANEMIA

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Pernicious anemia, then, is a disease in which the normal fatty marrow of the long bones is replaced by red marrow, showing under the microscope active regenerative changes in the shape of normablasts, megaloblasts, etc. There is usually a fatty degeneration of the heart, liver and kidneys, and there may be a considerable enlargement of the spleen. The changes in the blood are its pale color, often excessively so; its low specific gravity and slow coagulation, its thin and watery appearance; the great reduction in the number of red cells, often below 1,000,000; the low but relatively high haemoglobin so as to give a color index near or above 1. As a rule there is a diminution of the white cells and particularly the Poly. per cent, and the smeared specimen of poikilocytosis (abnormal shapes), anisocytosis (great variation in size) and the abnormal cells, megaloblasts, normablasts, megalocytes and myelocytes.

The symptoms of pernicous anemia usually come on very insidiously and gradually, so that it is often difficult to say when the disease started. Loss of strength is the first symptom noted by the patient; and pallor, by the patient's family. Owing to the poor supply of oxygen, the function of practically every organ in the body is affected. There is great feebleness and the patient is easily exhausted and very languid. The pallor is often extreme so that the whole body looks waxy; often there is a slight yellow tinge and there may be subcutaneous hemorrhages. The conjunctiva is pale and the lips and tongue are often excessively so. The mouth and tongue are usually dry, there is loss of appetite, often eructations of gas, nausea and sometimes vomiting of food and even blood. The normal hydrochloric acid of the gastric juice is apt to be diminished and may be absent entirely. There is usually constipation. There are apt to be attacks of palpitation, fainting and always a more rapid pulse. There is generally a soft blowing murmur over the base of the heart. There may be some fever and at times, especially in the aplastic form and late in the disease, it may get quite high, 103 or 104°. The pupils are usually dilated, and where there is involvement of the spinal cord they do not react well to light. Vision is sometimes disturbed and there may be even temporary blindness. There are hemorrhages into the retina:

there is vertigo, ringing in the ears and sometimes evidence of mental weakness through an anemia of the brain. The breathing is more rapid than normal and in the late stages there is often a distressing "air hunger." The urine is pale and may show albumin. There is sometimes considerable dropsy. Occasionally the spinal cord is involved and gives symptoms like locomotor ataxia, with loss of reflexes and bladder control, abnormal sensations in the legs, some numbness, loss of knee jerks, ataxia, etc. In the aplastic type the disease is apt to run an acute course with hemorrhages and high fever. The course of the disease varies greatly, in some cases death supervenes early; others may live quite a long time. There are apt to be remissions so that the patient may get up and be about after having been confined to the bed. Eventually all cases seem to be fatal.

The treatment has been most unsatisfactory, so that there have been many who have been inclined toward leaving the patient alone, except for rest and general tonic treatment.

The conservative plan of treatment has been to put the patient to bed with open windows and a generous diet. An estimation of the hydrochloric acid in the stomach should be obtained and if the gastric analysis shows a diminution or absence of hydrochloric acid, it should be supplied in twenty or thirty drop doses after meals, well diluted and taken by means of a glass tube. Essence of pepsin appears to aid digestion at times. Any focus of infection should be eliminated if possible; the teeth should be carefully examined and put in good shape, although oral sepsis by itself is certainly not the cause of the disease. A diet rich in iron does not seem to be of as much benefit in this disease as in simple chlorosis or the so-called secondary anemias. In fact the liver is already full of iron. Nevertheless, such a diet should be tried. The foods that contain most iron are meats, yolk of egg, oat meal, spinach, apples and carrots. Easily digested things should be given, milk, eggs (raw or cooked) meats and beef juice (made by the cold process of covering the cut-up meat with cold water, allowing it to stand and squeezing out the water and dissolved albumin), raw beef sandwiches with cut-up onions, green peppers or chives, junket, custards, apple sauce and baked apples. Some years ago, favorable results were reported from the use of red bone marrow either raw and spread on bread or as a glycerine extract. It may be necessary to give fully peptonized milk if there is vomiting. Some will apparently have more appetite when they take a little wine, such as a good claret or a little sherry. Alcohol may also be given in the shape of an eggnog or a milk punch.

In the way of drugs, arsenic has always held the first place. It has been given by mouth as Fowler's solution and by hypodermic as the cacodylate of soda or iron. From time to time there have been very favorable results reported from the use of salvarsan intravenously. In cases where the writer has tried salvarsan, there has been no benefit from it. In all cases a Wassermann reaction should be done and of course if positive, one could expect a decided improvement from the use of salvarsan.

The other two methods of treatment that have been recommended lately are blood transfusion and the removal of the spleen. Blood transfusion was tried a good deal some years ago and then given up. At that time it was usually done as one massive transfusion when the patient was more or less moribund, but with the more simple methods of transfusion it has come again into quite general use. The method of direct transfusion from the artery of the donor to the vein of the recipient will probably not be again in very general use. It requires a good deal of technical skill on the part of the operator, the loss of his artery and quite a large wound on the part of the donor, and the loss of the vein and a large wound on the part of the recipient. Besides, there is no very good method of determining the amount that has been transfused. Lindeman's method, by a number of small syringes which are rapidly filled from the vein of the donor and as rapidly injected into the vein of the recipient, also requires a great deal of technical skill. The writer has never used the Kimpton-Brown method of receiving the donor's blood into a glass vessel coated with paraffin, but it would probably be the method of choice did it seem probable that there was any objection to the citrate of soda method. Defibrinated blood, obtained by whipping out the fibrin has also been recommended, both by transfusion and simple subcutaneous injection.

Certainly the simplest method is to use a solution of citrate of soda to prevent coagulation. Varying strengths of this chemical have been advised, but it probably requires about one-third of one per cent solution in the blood to prevent coagulation. The writer has used this strength solution for some time with apparently perfectly safe results. The solution used is 12 per cent, so that 0.5 cc. added to 19.5 cc. of blood will give $\frac{1}{3}$ per cent solution.

The technique is very simple. The donor lies on the edge of the table with his arm hanging down, a piece of rubber tubing is put about the upper arm and held by an artery clamp; it should be tight enough to distend the vein and at the same time to allow a good flow in the artery. Scrubbing the arm with denatured alcohol seems to distend the vein, and snapping with the finger also helps. A small amount of cocaine may be injected so as to make a wheal in the skin over the most prominent part of the vein, and then a needle of large caliber may be used without pain. The needle is plunged into the vein and the blood is allowed to flow into 2 oz. glass bottles. By using a number of these bottles, any desired amount can be collected, and if any accident like clotting or dropping the bottles occurs, one has not lost all of the blood. As each bottle is filled it is passed to the nurse who mixes it thoroughly by tilting and shaking the bottle. Then the blood may be filtered through a fine-wired sieve, to remove any possible clots, into a larger bottle from which it is injected into the vein of the recipient. For this purpose the writer happens to use a 12 ounce nursing bottle with a small hole drilled in the bottom into which may be fitted a small rubber cork, and into this same hole, when the bottle is inverted, may be fitted a piece of glass tubing covered by rubber with a Paquelin cautery bulb attached. In this manner the blood may be forced through quite a small needle. A piece of rubber tubing, fitted to the neck of the bottle, carries at its other end a two-way stop cock and needle. When the cock is shut off and the needle is plunged into the patient's vein, the blood appears at the lateral opening of the stop cock, which is then turned and the blood is forced in by the pressure in the Paquelin cautery bulb.

Whatever method of transfusion is selected, the donor's blood must be tested against the recipient's. The writer has used the Rous method, which depends upon mixing the two citrated bloods together and watching the behaviour of the red cells under the microscope. If the bloods do not agree, there will be a clumping of the red cells; otherwise, they are evenly spread. The writer is of the opinion that small transfusions of not more than 300 cc. are of just as much benefit, in most cases, as the larger ones, although it is usually customary to transfuse about 500 cc. or more. If the blood of one donor does not improve the patient, another donor should be tried. The writer has one patient who has been kept in comparative health for about two years by these repeated transfusions. He is chiefly benefited by the blood of one donor, and this donor, although beyond fifty years of age, has been used about sixteen times with no apparent ill effect upon his health.

Eppinger has been chiefly responsible for bringing to the attention of the profession the possible advantages of splenectomy. This operation is not to be undertaken lightly however. It must be remembered that the patients are not good operative risks, that the wound is likely to bleed and also to suppurate. Krumbhaar's analysis of 153 cases gave the post-operative mortality at about 20 per cent.

This has been much improved, however, of late. There are those who hold that splenectomy should be reserved for the cases where all other methods have failed, and again there are those who hold that it should be done right away, or possibly as soon as the patient can be improved by one or two transfusions. The situation can be summarized as follows:

1. So far, probably, no case of pernicious anemia has ever been permanently cured by any method of treatment.
2. Almost all patients are likely to have periods of improvement without any treatment.
3. Rest in bed, forced feeding, fresh air and arsenic may be given a trial.
4. If these conservative methods do not cause a distinct improvement, blood transfusion should be tried.
5. If the blood transfusions do not seem to improve the patient, a splenectomy should be done.
6. The more favorable cases for splenectomy are the younger patients, those who have not had the disease too long, those in whom there is an enlarged spleen, and finally those who do not have a count below 1,500,000.
7. There are a considerable number of physicians who would advise immediate operation.

Nothing has been said as to the cause of the disease. It seems that there is some agent causing an haemolysis (a dissolving) of the red cells, and the spleen seems to play an important part in this destruction, so that although splenectomy does not at all remove the cause, it seems to remove one of the ways in which the cause acts, but exactly what causes this haemolysis is still a mystery.

The Massachusetts Board of Registration of Nurses will hold an examination for applicants for registration on Tuesday and Wednesday, June 26 and 27, 1917, in Boston. Application for any examination must be filed at least five days before the examination date.

This examination is being held in addition to the three specified in the law. The above dates have been purposely selected to give the more recent graduates and those desiring to join the Red Cross, an early opportunity to register.